Intellectual Property Office of New Zealand
Te Pou Rāhui Hanga Hou

CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 5 June 2002 with an application for Letters Patent number 519386 made by DIABLO INDUSTRIES LIMITED.

I further certify that pursuant to a claim under Section 24(1) of the Patents Act 1953, a direction was given that the application proceed in the name of HENLEY INDUSTRIES LIMITED.

Dated 27 June 2003.

Neville Harris
Commissioner of Patents

CHANGE OF NAME OF APPLICANT

Patents Form No. 4

Patents Act 1953

PROVISIONAL SPECIFICATION

IMPROVED CONVEYOR

We, DIABLO INDUSTRIES LIMITED, a New Zealand company, C/o McIntyre Dick & Partners, 160 Spey Street, Invercargill, New Zealand, do hereby declare this invention to be described in the following statement:

The present invention relates to a conveyor, and in particular to a conveyor which is capable of altering the spacing between articles supported in a row across the width of the conveyor, i.e. perpendicular to the direction of movement of the conveyor.

A standard conveyor simply moves articles placed on the conveyor from one location to another, with the articles remaining at the same spacing. In general, if the spacing of the articles has to be altered for manufacturing purposes, then the articles on the conveyor are thinned out or reoriented by moving them relative to the conveyor; in general, this is performed manually.

One known design of conveyor which is capable of re spacing articles comprises a conveyor surface made up of a series of polyurethane cords arranged in a fan shaped configuration with the length of each cord aligned with the direction of movement of the conveyor. The cords are moved by individual driving bobbins, mounted on a pair of spaced curved axles, one axle at each end of the "fan". However, this type of conveyor has proved unsuitable for use with greasy or oily products (for example some food stuffs) because the cords are driven by a friction drive and have a tendency to slip:- any additional oil or grease on the cords makes this problem much worse. Further, this type of conveyor is difficult to clean.

It is an object of the present invention to provide a conveyor which is capable of re spacing articles carried on the conveyor which overcomes the above described problems.

The conveyor of the present invention has been designed with especial reference to the problem of conveying strips or fingers of food stuffs which have been cut from a solid block and deposited straight onto the conveyor to be moved for further

processing. Since the fingers have been cut from a solid block, they are deposited onto the conveyor with all the fingers touching each other, and the fingers need to be spaced apart for further processing to take place. However, it will be appreciated that the conveyor of the present invention is suitable for a wide range of applications where articles supported by the conveyor need to be spaced further apart or moved closer together.

The present invention provides a conveyor comprising a pair of spaced, parallel drive means arranged one each side of the path of the conveyor, a plurality of spaced parallel rigid supports secured between said drive means with the longitudinal axes of said supports perpendicular to the path of the conveyor; a pair of guide tracks arranged symmetrically between said drive means, said guide tracks being arranged to converge or diverge from a first predetermined spacing at one portion of said guide tracks to a second predetermined spacing at another predetermined portion of said guide tracks; a plurality of pairs of retainer blocks, each pair of blocks being mounted on said supports, with one block of each pair being engaged in one of said guide tracks and the other block of each pair being engaged with the other of said guide tracks; and a coil spring mounted around each said support, between each pair of retainer blocks and engaged therewith such that the coil spring expands or contracts as the spacing between said retainer blocks increases or decreases.

By example only, a preferred embodiment of the present invention is described in detail, with reference to the accompanying drawings in which:-

Figure 1 is a diagrammatic plan view of a conveyor in accordance with the present invention;

Figure 2 is a section online II - II of Figure 1;

Figure 3 is an exploded plan view of a detail of Figure 1;

Figure 4 is a side view of Fig. 3, with the components fully assembled;

Figure 5 is an exploded plan view of an alternative version of Figure 3; and

Figure 6 is a side view of Figure 5, with components fully assembled.

Referring to the drawings a conveyor 2 includes two spaced parallel drive chains 3,4 of known type which are arranged to support and drive a conveyor bed 5 located between the drive chains. The conveyor 2 is supported above the ground or floor by any suitable type of support (not shown).

The drive chains 3,4 are located one down each side of the path of the conveyor. Each drive chain may be of any suitable type, for example, a continuous length of hollow pin chain driven by drive sprockets at one or both ends of each run of chain, one or both drive sprockets being rotated by an electric motor.

The conveyor bed 5 is positioned symmetrically between the drive chains 3,4 and consists of two guide tracks 6,7 which support a plurality of retainer blocks 8 arranged in opposed pairs, each pair of retainer blocks 8 supporting a pair of elastic elements 9, 9a, as described with reference to Figures 3-6.

Each retainer block 8 is rectangular in plan and square in cross-section. Each block 8 is formed with a pair of spaced through holes 8a, each of which passes right through the width of the block. Each hole 8a receives a stainless steel rod 10 which has a length greater equal to the distance between the drive chains 3,4.

Each rod 10 is secured at one end to the drive chain 3, passes through the hole 8a of

one retainer block 8, extends across the width of the conveyor bed 5, passes through the hole 8a of the other retainer block 8 of that pair, and is secured at the other end to the drive chain 4.

The pairs of retainer blocks 8 are arranged with one of the blocks of each pair engaged with the guide track 6, and the other block of each pair engaged with the guide track 7. A pair of parallel coil springs 9 extend between each pair of blocks 8, around the corresponding rods 10.

As shown in Figures 4 and 6, each retainer block 8 carries a guide roller 11 mounted below the block on an axle 12 which is substantially perpendicular to the plane of the corresponding block.

Figures 3 and 4 show one arrangement of the coil springs, in which the coil springs 9 are stainless steel tension springs. In this embodiment, each end of the spring 9 is anchored within the hole 8a in the retainer block 8 by means of a retainer bush 17 which incorporates a screw retainer 18. The screw retainer 18 provides a screw of the same pitch as the spring 9, with the retainer 18 being sized to allow the spring 9 to be screw-threadedly engaged with the internal screw thread on the retainer 18. To secure each end of the spring 9 to the corresponding retainer block 8, the bush 17 is mounted onto the rod 10 on the opposite side of the retainer block 8 to the coil spring 9, and push-fitted into the hole 8a. The bush 17 is an interference fit in the hold 8a and when in position engages the axle 12 to lock the axle 12 and roller 11 to the block 8. One end of the coil spring 9 is then screwed into the screw retainer 18. Each end of each coil spring 9 is secured in the same way.

An alternative arrangement is illustrated in Figures 5 and 6. In this variant, a plastics

compression coil spring 9a disused in place of the spring 9. Since the spring 9a is a compression spring, it is dimensioned so that it is fully compressed when the conveyor bed is at its narrowest (A), and expanded when the conveyor bed is at its widest (B). Because the spring 9a is in compression, it does not need to be secured to the retainer blocks 8:- each end of each spring 9a simply butts up against a bush 20 which slides over the rod 10 and is press fitted into the hole 8a in the corresponding block 8. The bush 20 locks the axle 12 and roller 11 to the block 8 when fitted into the hole 8a.

Each guide track 6,7 provides two U-cross-section channels 13,14 (Figure 2)each of which is dimension and arranged to receive the guide rollers 11 of the retainer blocks 8. The channels 13,14 are arranged back-to-back:- the channel 13 carries the guide rollers of the retainer blocks for the upper run of the conveyor, and the channel 14 carries the guide rollers of the retainer blocks for the return run of the conveyor.

The guide tracks 6,7 diverge from each other so that the width of the conveyor at the end of the run B is substantially wider than the width of the conveyor at the start of the run A, assuming that the conveyor is moving in the direction of Arrow M. The degree of divergence may be altered to suit particular applications; in the particular example illustrated in Figure 1, the effective width of the conveyor at the start A is 500 mm and the effective width of the conveyor at the end B is 750 mm.

The above described conveyor is used as follows:- the conveyor 2 is to be used to carry narrow slices 15 of frozen fish from start position A to end position B. At start position A, a large block of frozen fish is sliced into slices 15 using a saw or similar known means, and the slices 15 are allowed to fall onto the conveyor, with the length of each slice parallel to the direction of movement M of the conveyor. Because the slices 15 have been cut from a large block and fall directly onto the conveyor, they lie

very close to each other, possibly even touching each other. For further processing (in this case battering and crumbing to form fish fingers) the slices 15 must be separated.

The conveyor 2 is moved by the rotation of the drive chains 3,4:- each pair of retainer blocks 8 is secured to the adjacent drive chains 3/4 by the rods 10, so that movement of the drive chains 3,4 slides the retainer blocks 8 along the channels 13 in the guide tracks 6,7.

As the tracks 6,7 diverge, the springs 9, 9a secured between the pairs of retainer blocks 8 extend to accommodate the increased width of the conveyor.

As the springs 9,9a gradually extend, the slices 15 of fish carried on the springs are spaced further and further apart, until by the time the end B of the conveyor is reached, the slices 15 are at the desired spacing for further processing. At the end B, the slices 15 are removed from the conveyor for further processing, and the springs 9,9a, retainer blocks 8 and rods 10 travel onto the return (i.e. lower) run of the conveyor.

It will be appreciated that the above described conveyor could be run in the opposite direction if it was required to converge product carried on the conveyor rather than diverge it.

It is believed that it may be possible to substitute elastic cords for the coil springs 9 for some applications.

It is envisaged that the conveyor may be secured together by a series of spaced tie rods (not shown) which extend parallel to the rods 10 and are positioned between the

upper and lower runs of the conveyor. Advantageously, some or all of the tie rods could be formed as air-knives or as a water-spray (sparge) line, for cleaning the conveyor.

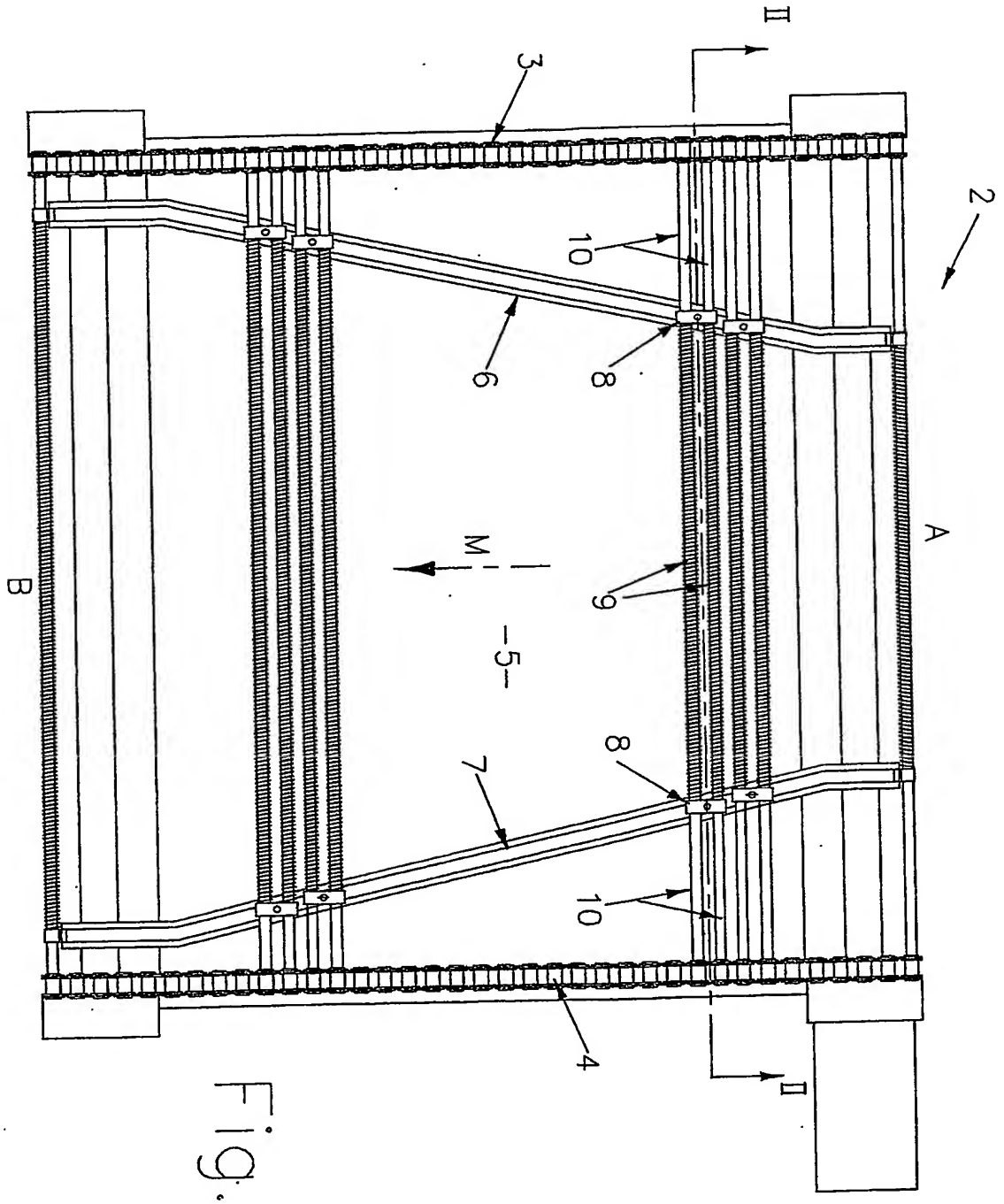

Fig. 1

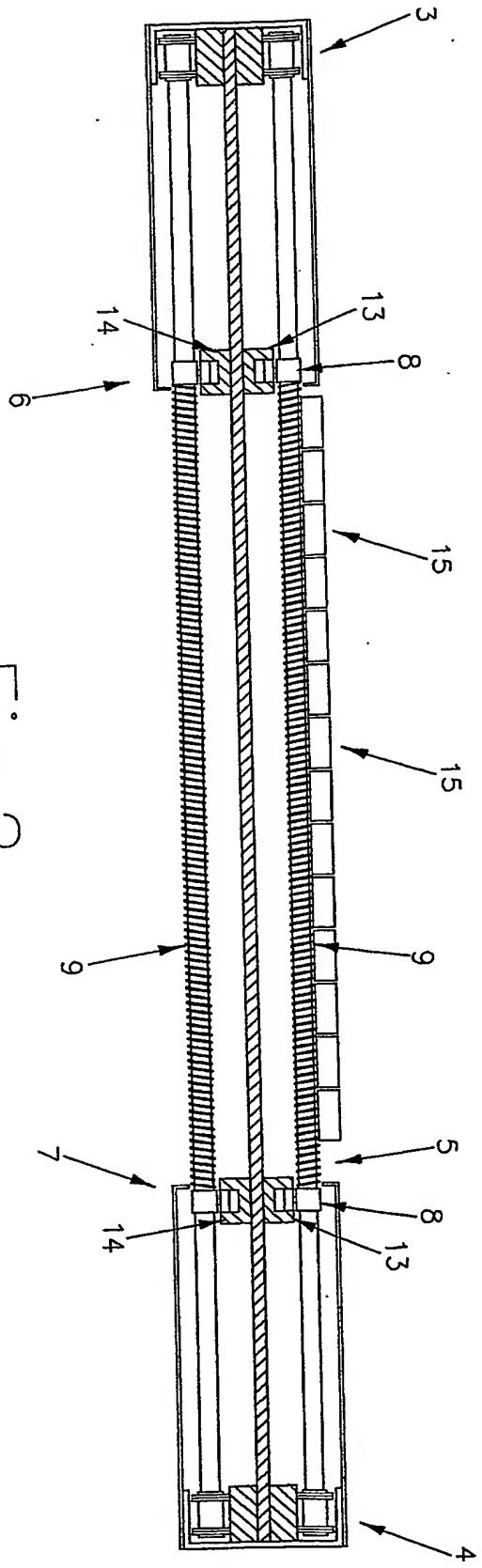

Fig. 2

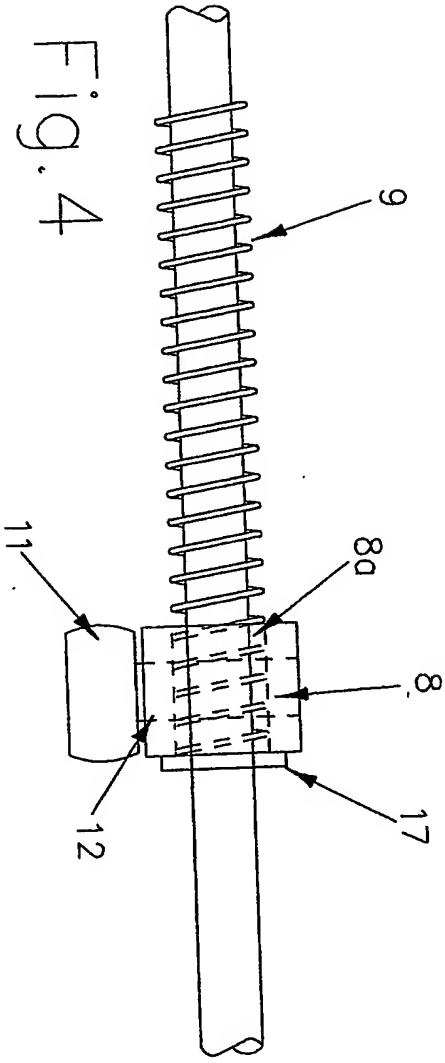

Fig. 4

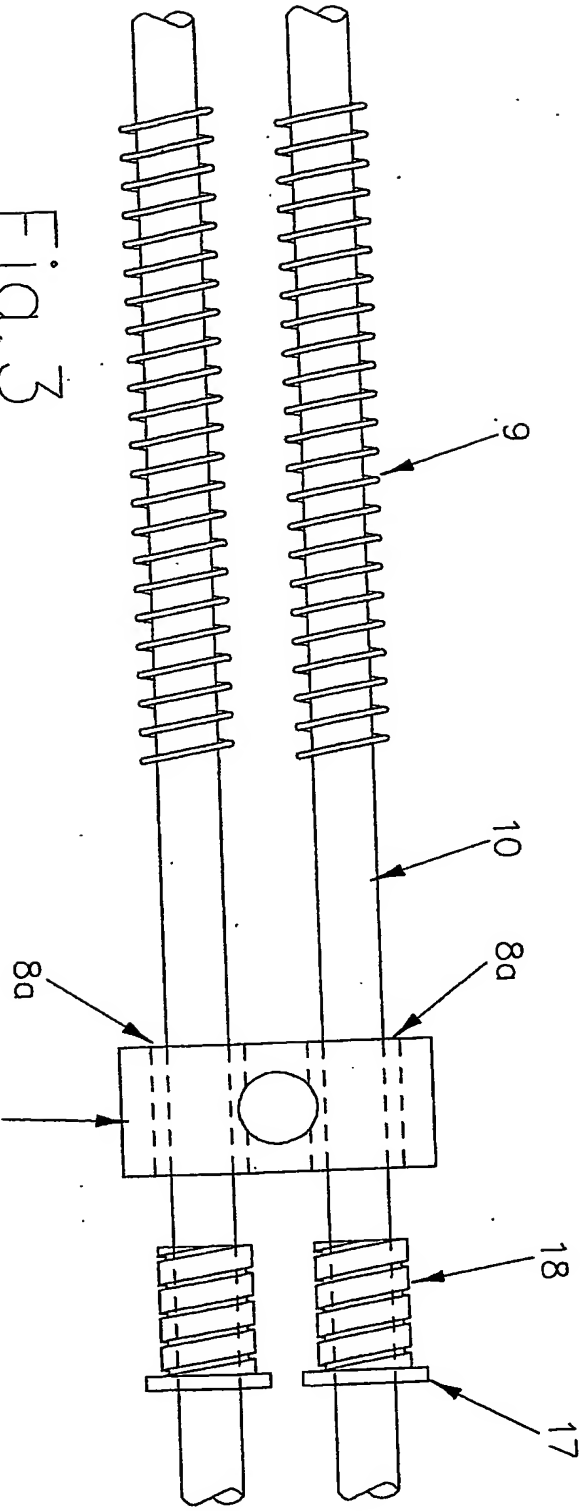

Fig. 3

Fig. 5

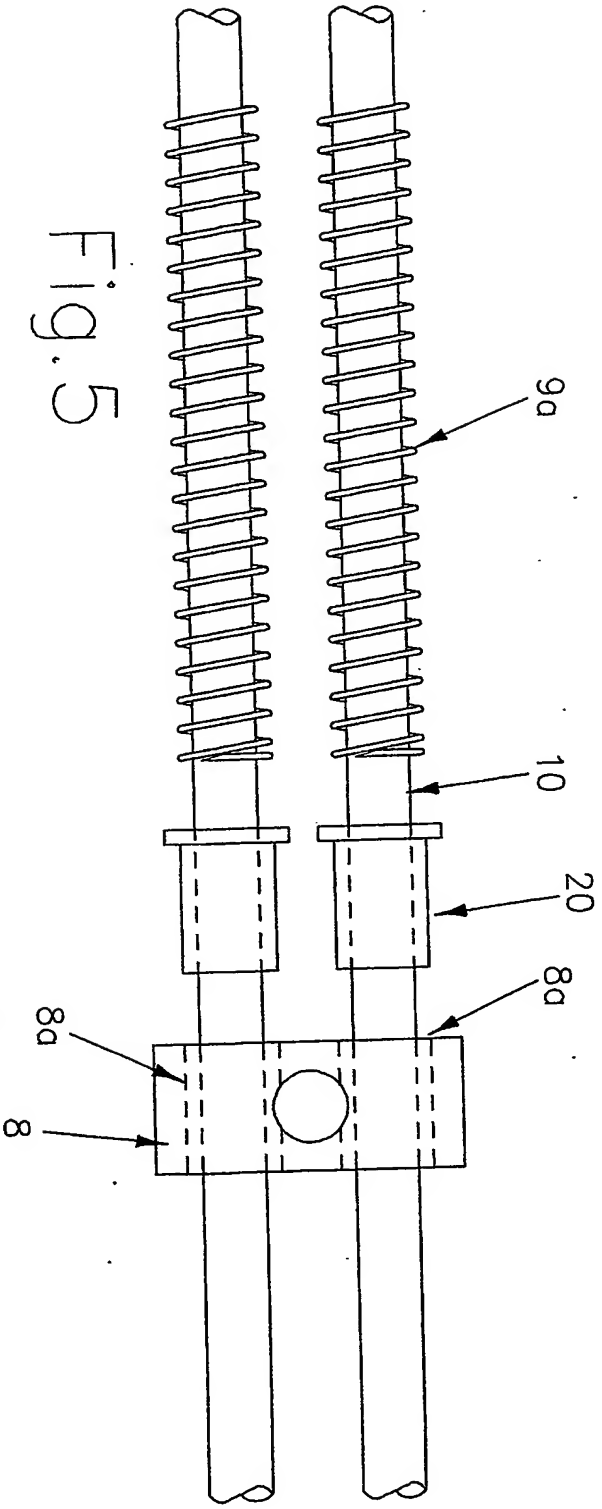

Fig. 6